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| **Unit 4: Elasticity** | |
|  | **Learning Objectives:** | |
|  | 1. Understand the concept of price elasticity of demand. 2. Use a simple formula to calculate elasticity. 3. Understand the relationship between the slope of a demand curve and elasticity. 4. Use real world examples to demonstrate that the concept of elasticity is a powerful tool. 5. Apply the concept of elasticity to supply, income, and to price changes of related products. |  |
|  | **Learning Materials:** | |
|  | * Chapter 4 - Principles of Microeconomics | |
|  | **Overview of this Unit** | |
|  | How sensitive are you to price changes? Take for example the price of gas. If you have to drive to school or work in the morning, how would you feel by the fact that gas prices had increased by 50% over last week? It would hurt! Assuming that you drive the same vehicle, would you buy significantly less gas when gas is more expensive? If you have to drive, you probably have to use almost as much gas now as you used before the price increase. How about when the price of Excel gum goes up by 50%? Would you buy as much of that brand of gum anymore? Maybe you would switch to a less expensive alternative or simply chew less gum.  This unit explores our purchasing reaction to price changes in the marketplace. Economists call this demand sensitivity to price, Price Elasticity. In this unit we will look at how this sensitivity can be measured and assessed. | |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Measuring Price Elasticity

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| **Unit 4 - Topic 1: Measuring Price Elasticity of Demand** |
| Economists can measure the effect of a price change on market demand.  They do this by taking the percentage change in quantity demanded and dividing it by the percentage change in price.  This calculation yields the **Coefficient of Elasticity**.   |  |  |  | | --- | --- | --- | | **Coefficient of Elasticity** | | | | **(% change Quantity Demanded / Average Quantity Demanded) x 100 /  (% Change in Price / Average Price) x 100** | | | | **Coefficient** | **Elasticity** | **If a seller increases prices, revenues will:** | | < 1 | Inelastic | Go Up | | = 1 | Unitary | Remain the same | | > 1 | Elastic | Go Down |   If the number yielded from the calculation of coefficient of elasticity is less than one this indicates an inelastic demand.  Inelastic demand suggests that demand change is relatively insensitive to a given price change.  Inelastic demand means that a seller's total revenue will continue to increase as its prices increase.  When most people have to buy gas because they need to drive we say that demand for gas is relatively inelastic.  If the number yielded from the calculation of coefficient of elasticity is greater than one, this indicates an elastic demand.  Elastic demand suggests that demand change is relatively sensitive to a given price change.  Elastic demand means that a seller’s total revenue will fall as its prices increase.  Excel gum purchases will likely drop by a greater percent than its relative price increase. **This** indicates an elastic demand for Excel gum.  **Gasoline**  To clarify how to apply the coefficient of elasticity formula, the process is outlined in the following example relating to changing gas prices.  The basic question to be addressed is:  Is the demand for gas fairly stable within a given price increase?  Let's assume prices go from $1.00 a litre to $1.20 a litre.  You can answer this question using the formula for determining the Coefficient of Elasticity.  **A) Calculate percentage change in quantity demanded:**   |  |  |  | | --- | --- | --- | | **Price (P)** | **Quantity Demanded/Day (Q)** | **Total revenue (P\*Q)** | | $1.00 | 1000 litres | $1000 | | $1.20 | 900 litres | $1080 |   **1) Calculate the absolute change in quantity (numerator):**   Original Quantity Demanded - Post price change Quantity demanded (numerator)   (1000 – 900) =  **100**  **2) Calculate the Average quantity demanded (denominator)**   (Original Quantity Demanded + Post price change Quantity demanded) / 2   (1000+900) / 2   = **950**  **3) Divide the absolute change in quantity demanded by the average quantity demanded and multiply by 100 to get a percentage to get the Percent change in quantity.**  (100/950) \* 100 = **10.5%**  **B) Calculate percentage change in price:**  **1) Calculate the absolute change in price – ignore negative numbers (numerator):**   Original Price – New Price   (100 – 120) =  20  **2) Calculate the Average Price (denominator)**   (Original Price + New Price) / 2   (100+120) / 2   = 110  **3) Divide the absolute change in price by the average price and multiply by 100 to get a percentage to get the Percent change in price.**   (20/110) \* 100 = **18.2%**  **C) Calculate the Coefficient of elasticity by dividing Percentage change in Quantity Demanded (A) by the Percentage change in Price (B)**  10.5%   =  0.58  18.2%   |  |  | | --- | --- | | https://d2l.cna.nl.ca/content/On_Campus_Course_Support/EC1100_On_Campus_PT_CL/images/note.gif | Please note that 0.58 is less than 1 so this indicates an **inelastic demand -** i.e. demand for this product is relatively affected by a change in its price. | |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Determinants of Price Elasticity

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| **Unit 4 - Topic 2:  Determinants of Price Elasticity of Demand** |
| So what causes the demand of a given product to be elastic or inelastic?  There are a number of reasons including:   * **The availability of substitutes:** The more substitutes there are available, the more elastic demand is because people can switch easily from the higher priced product to one that is less expensive. * **The percentage of household income spent on the commodity:** The larger the percentage of one’s income that is spent on a particular commodity, the more elastic is the demand for that commodity. * **The amount of time that has elapsed since the price change:** The elasticity of demand tends to be greater the longer the time period involved. |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Coefficient of Elasticity

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| **Unit 4 - Topic 3:  The Coefficient of Elasticity Changes over the Demand Curve** |
| We have seen how to calculate a demand curve in Unit 2.  You can calculate the coefficient of elasticity over the entire demand curve.  If you do this, you will note that the coefficient of elasticity will change at each price point.  It will be elastic towards the top of the curve and inelastic towards the bottom.  This occurs because higher price points are found at the top of the demand curve.  Total revenue will increase as we move down the demand curve – As we move to the right down the curve price is going down and quantity demanded is going up – this is a characteristic of elastic demand.  As prices continue to fall along the curve, people will buy more of the product but less will be made on each unit – theoretically price could drop to 0 and no revenue would be generated by the product.  The balance point at which the percentage change in quantity equals the percentage change in price is known as having unitary elasticity. |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Applications of Demand Based Elasticity

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| **Unit 4 - Topic 4:  Applications of Demand Based Price Elasticity** |
| So what is the practical application of calculating and understanding elasticity you ask?  What we are doing here is asking: “What effect does a change in price or a change in quantity have on **seller’s** bottom line?  Government, for example, must ask this question before imposing sales taxes.  Additional taxes simply add the price of a product.   If the effective price increase is too high a firm’s revenue will decline.  Such a situation could put many firms out of business – a situation that government would want to avoid.  Some products are more easily taxed than others.  Products that tend to have inelastic demands - where the percentage change in demand will not be as great as the percentage change in price - are prime targets for government taxation.  Things like gasoline, cigarettes and alcohol tend to have relatively inelastic demands so that revenue (remember tax revenue goes to government!) continues to increase through price increases. |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Applications of Supply Based Elasticity

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| **Unit 4 - Topic 5:  Applications of Supply Based Price Elasticity** |
| From a supply point of view, reducing or increasing the supply of a given product in a market where demand is very inelastic will result in price changes. People will tend to want to buy just as much of certain ‘inelastic” product with little consideration of the price. This is basis on which government charges high taxes on goods such as tobacco and alcohol – so called sin-taxes – because people will buy these products with limited consideration of their price. Life saving drugs make an excellent example of inelastic demand. Insulin users will tend to buy similar amounts of insulin no matter what the price – their life depends on it.  Unfortunately, the same concept outlined above holds true for highly addictive illegal drugs such as alcohol and cocaine. Addicts (buyers) will want to buy as much of the product no matter what the price. It is this rationale that has been used to argue against “the war on drugs”. If government’s crackdown on illegal drugs reduces the supply from smugglers, prices will rise. Some economists argue that cracking down on drug crime causes other criminal activity to increase as addicts are forced to steal in order to fund their expensive habit.  Similarly, increasing the supply of inelastic goods has negative consequences for Sellers. If supply of a commodity goes up, prices will be forced down. Inelastic demand for such products as grain means that demand will not change significantly relative to price. Fisherman or farmers who have an exceptional bountiful year will find that because of inelasticity they will produce more units, but prices per unit will be forced down – they simply won’t make as much! |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Other Measures of Elasticity

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| **Unit 4 - Topic 6:  Other Forms of Elasticity** |
| Elasticity measures buyer or seller sensitivity. Price elasticity, as we have seen, measures a **buyer’s** sensitivity to price changes. There are however other points on which to measure sensitivity. We will review these next.  ***Elasticity of Supply***  Elasticity of supply measures how sensitive suppliers are to price changes in their products. Some suppliers will supply significantly more product with a given price increase – this is said to demonstrate an elastic supply. Other suppliers will tend to supply similar amounts of product regardless of the price. The National Hockey League and their recent troubles make an excellent case in point. As you know, NHL arenas have a set number of seats. This constitutes an inelastic supply over a short term and ridiculously high seating prices have been the result. To keep hockey an ‘everyman’s sport in hockey towns, significant pressure has been placed on these city councils to build bigger arenas with greater seating capacity so that more people can be accommodated at lower, more manageable prices.   |  | | --- | | **Elasticity of Supply =** % change in **Quantity supplied**  /  % change **in price** |   ***Income Elasticity***  Elasticity can also be measured relative to an individual's income.  The  theory is that as one's income increases his or her ability to pay more goes up so he / she becomes less price sensitive.   This sensitivity can be measured by calculating income elasticity.  Using the calculation yields a number less than or greater than 1.  A number exceeding 1 indicated that the product in question is income elastic and therefore its demand is sensitive to income changes - Air travel is a good example of this.  As people attain higher incomes they are more inclined to fly rather than drive (they pick a relatively expensive but quick option rather than a relatively less expensive but slower option)  A number less than 1 indicated income inelastic and therefore its demand is not as sensitive to income changes.   |  | | --- | | **Income Elasticity =**  Percent Change in Quantity Demanded / Percent Change in income |   ***Cross Elasticity of  Demand***  Cross Elasticity of demand looks at the demand of one product relative to the demand for another.  The measure of cross-elasticity simply compares the relative percent change in demand for one product against the relative to the percentage change in price for another.  Goods that tend to be sold together such as skis and ski boots are said to be compliments and yield a negative cross elasticity.  Goods that tend to be substitutes have positive cross elasticity of demand.   |  | | --- | | **Cross Elasticity of demand =**  Percent change in Demand of product A / Percent change in price of product B | |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Interactive Graph - Elasticity and Revenue

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| **Unit 4: Interactive Graph - Elasticity and Revenue** |
| **Graphing Exercise: Elasticity and Revenue**  How will consumers respond to a price change? Sales will increase if price falls, but by how much? Will a higher price lead most people to buy a substitute instead? And if they do, is it possible that the seller's revenue might actually decrease? The price elasticity of demand, Ed, is a measure of buyer responsiveness to price changes. It equals the ratio of the percentage change in quantity demanded to the percentage change in the price. If the quantity change exceeds the price change in percentage terms, Ed is greater than one (in absolute value) and we say demand is elastic. Demand is inelastic if the quantity change is less than the price change in percents; Ed is less than one. The elasticity of demand varies from one product to another. It may even vary for the same product: demand for a product may be more elastic at high prices than at low prices and is usually more elastic in the long run than in the short run.  **Exploration: How does the elasticity of demand vary along a straight-line demand curve?** |

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| The graph illustrates the demand for soft drinks at a large grocery store. At the current price of $3, sales are 3000 cases per week, generating total sales revenue of $9,000. By dragging the green price triangle on the demand curve, you can observe the relationship between the **prices**, quantity demanded, and total revenue. Click on the Elasticity button to calculate the price elasticity over the selected range of the demand curve. |

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| **Self Quiz** | | |
| ***1.*** | What is the elasticity of demand over the $4 to $5 price range? | Show Answer |
| ***2.*** | What is the elasticity of demand over the $1 to $2 price range? | Show Answer |
| ***3.*** | Experiment on your own. Over what range of the demand curve is demand elastic? Is there a price range over which Ed is 1, or "unit elastic?" | Show Answer |
| ***4.*** | Select an elastic range of the demand curve. What happens to total revenue when price is increased through this range? | Show Answer |
| ***5.*** | Select an elastic range of the demand curve. What happens to total revenue when price is increased through this range? | Show Answer |
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**Discussion Board Posting for Unit Four: *Elasticity***  
  
Government officials and environmentalists often argue that people should use more public transportation in order to curb air pollution. Using the theories of elasticity (price elasticity, elasticity of supply, income elasticity & cross-elasticity), discuss under what circumstances people may be more or less inclined to use public transportation?  
  
By Wednesday, go to the Discussion Board and post your response to this statement. Do you agree or disagree? Why or why not"? Respond to at least one other posting by Saturday.  
  
**Note:** Respond to the topic “*Unit Four: Elasticity*”

**Source:** McGraw-Hill Ryerson, 2004.

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Summary

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| **Unit 4 - Summary** |
| Elasticity is the measure by which we assess buyer's reaction to price changes in the marketplace.   Economists call our demand sensitivity to price, Price Elasticity.  Several factors contribute to consumer sensitivity to price changes including, the availability of close substitute products, the percentage of one's income used to make the purchase of the product in question and the amount of time that has elapsed since the price change.  We can assess the level of price sensitivity using several economic tools including Price elasticity calculations, income elasticity calculations and cross elasticity of demand calculations. |

EC1100 Microeconomics - PT (CL) - Unit 4.  Elasticity -    Suggested Problems

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| **Unit 4 - Suggested Problems** |
| In order to reinforce what you have learned in this unit I suggest you review the following end-of chapter problems.  The following problems are located at the end of the chapter.  Once you have attempted this review  [Student Answer Key](http://highered.mcgraw-hill.com/sites/0070946418/student_view0/answer_key.html).   * **#36a Key Problem** * **#37a** * **#38a** * **#39a** * **#40a** * **#41a** |